

Amendments to the Specification

The paragraph starting at page 3, line 3 and ending at line 17 has been amended as follows.

The encoder, as shown in Fig. 10, is constructed so that a detector 703 detects light generated from an LED 701 via a ~~cord~~ code wheel 702 and generates a signal. On the code wheel 702 itself, alternating open portions through which light passes (704) and solid portions through which light does not pass (705) are disposed at set intervals, while photodiodes 706, 707, 708 and 709 are arranged at set intervals on the detector 703, with the light detected at each of the photodiodes 706-709 converted to electrical signal (A) 710, electrical signal (*A) 711, electrical signal (B) 712 and electrical signal (*B) 713, respectively, output, and the electrical signals 710-713 thus output are output by comparators 714 and 715 as differential output signals (channel A, channel B) 716, 717.

The paragraph starting at page 5, line 1 and ending at line 7 has been amended as follows.

In short, only when the outputs of all three of the DFFs 602-604 match does the JKFF signal output level ~~changes~~ change. Accordingly, with a circuit of the structure shown in Fig. 12, in order to make the output from all three of the ~~DFF~~ DFFs 602-604 match, the level of the digital encoder signal 605 must be constant for at least three clock signals or more.

The paragraph starting at page 7, line 11 and ending at line 27 has been amended as follows.

According to one aspect of the present invention, preferably, a printing apparatus for printing on a printing medium by a printhead, ~~the apparatus comprising:~~ printhead comprises scanning means, on which the printhead is mounted, for reciprocally moving the printhead in a first direction; conveyance means for conveying the printhead in a second direction different from the first direction; first detection means for detecting a position of the scanning means with respect to the first direction; first filter means for filtering out high-frequency noise overlaying a first detection signal generated by the first detection means according to conditions that reflect a movement condition of the scanning means; and printing control means for printing by controlling the printhead based on the first detection signal from which the noise has been filtered out by the first filter means.

The paragraph starting at page 10, line 23 and ending at page 11, line 1 has been amended as follows.

Further note that the above conveyance means may ~~includes~~ include a conveyance roller and conveyance gear for conveying the printing medium, may include a paper feed roller and conveyance gear for conveying the printing medium, and/or may include a paper discharge roller and conveyance gear for conveying the printing medium.

The paragraph starting at page 14, line 13 and ending at line 21 has been amended as follows.

In this specification, the terms “print” and “printing” not only include the formation of significant information such as characters and graphics, but also broadly ~~includes~~ include the formation of images, figures, patterns, and the like on a print medium, or the processing of the medium regardless of whether they are significant or insignificant and whether they are so visualized as to be visually perceivable by humans.

The paragraph starting at page 17, line 8 and ending at line 25 been amended as follows.

As shown in Fig. 1, the carriage 2 is connected to a part of a drive belt 7 of the transmission mechanism 4 to transmit the driving force of the carriage motor M1, and is slidably guided along a guide shaft 13 in the arrow A direction. Accordingly, the carriage 2 reciprocates along the guide shaft 13 by forward and reverse rotation of the carriage motor M1. Further, a scale 8 to indicate the absolute position of the carriage 2 is provided along the moving direction (arrow A direction) of the carriage 2. In this embodiment, as the scale 8, a transparent PET film on which black bars are printed is employed, and one end of the scale 8 is fixed to a chassis 9 while the other end is supported with a plate spring (not shown). The scale 8 has a structure like that of a ~~cord~~ code wheel

described with reference to Fig. 10, in which transparent portions and opaque portions are alternately provided.

The paragraph starting at page 26, line 16 and ending at line 24 has been amended as follows.

Thus, the mask signal generator 610 detects the edge of the digital encoder signal and sets the mask signal (Mask) to LOW. By so doing, both output signals from AND circuits 607a and 609a ~~continues~~ continue to maintain at LOW. During ~~the~~ that period of time there is no change in the level of the output from JKFF 608 and the mask signal generator 610 continues to maintain the level of the mask signal (Mask) 611 at LOW so long as certain predetermined conditions exist.

The paragraph starting at page 27, line 2 and ending at line 6 has been amended as follows.

(2) a velocity variable time mode, that measures an edge interval time of a digital encoder signal of an immediately preceding cycle and continues to hold a LOW level signal during a period that is n/m times ~~as~~ the length of the edge interval; and

The paragraph starting at page 35, line 6 and ending at line 21 has been amended as follows.

In such cases, a ~~cord~~ code wheel like that shown in Fig. 10 may be provided along the periphery of the conveyance roller gear 17 that is one part of the conveyance mechanism for the printing medium which is driven by the conveyance motor M2. In addition, a rotary encoder configured so as to pass light from an LED through the ~~cord~~ code wheel, detect the light that passes through the ~~cord~~ code wheel using a detector provided with a plurality of photodiodes disposed at predetermined intervals and then generate encoder signals from the detection, may be provided in the vicinity of the conveyance roller gear 17. With such an arrangement, noise may be filtered out of the encoder signals generated from the rotary encoder at the digital LPF circuit having the above-described structure.

The paragraph starting at page 37, line 16 and ending at line 23 has been amended as follows.

In other words, in response to a timing when the levels of the electrical signal (a) 801 and the electrical signal (*A) 802 intersect, ~~an~~ a leading edge and trailing edge of the differential output signal (Channel A) 803 are generated. By virtue of this feature, the controller 100 can obtain accurate position information and speed information from the digital encoder 150.

The paragraph starting at page 38, line 2 and ending at line 7 has been amended as follows.

Although operation modes in the digital LPF circuit 151 ~~in~~ with respect ~~with~~ to the stopped state 501, the acceleration state 502, the constant velocity state 503, the deceleration state 504, and the stopped state 505 shown in Fig. 9 have been described, the present invention is not limited to these operation modes.

The paragraph starting at page 39, line 13 and ending at page 40, line 9 has been amended as follows.

As the typical arrangement and principle of the ink-jet printing system, one practiced by use of the basic principle disclosed in, for example, U.S. Patent Nos. 4,723,129 and 4,740,796 is preferable. The above system is applicable to either one of the so-called on-demand ~~type~~ or a continuous type systems. Particularly, in the case of the on-demand type, the system is effective because, by applying at least one driving signal, which corresponds to printing information and gives a rapid temperature rise exceeding nucleate boiling, to each of electrothermal transducers arranged in correspondence with a sheet or liquid channels holding a liquid (ink), heat energy is generated by the electrothermal transducer to effect film boiling on the heat acting surface of the printhead, and consequently, a bubble can be formed in the liquid (ink) in one-to-one correspondence with the driving signal. By discharging the liquid (ink) through a discharge opening by growth and shrinkage of the bubble, at least one droplet is formed. If the driving signal is applied as a pulse signal, the growth and shrinkage of the bubble can be attained instantly and

adequately to achieve discharge of the liquid (ink) with the particularly high response characteristics.